AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application. Applicant submits that these new claims introduce no new matter.

LISTING OF CLAIMS:

Claims 51-72 (Cancelled)

73. (New) A method of electromagnetic field detection comprising:

providing three electromagnetic axial gradiometers in an electromagnetic field, each electromagnetic gradiometer having at least first and second electromagnetic field vector sensors connected in a differencing arrangement; and

angularly displacing each electromagnetic gradiometer about a respective axis relative to the electromagnetic field during operation of the electromagnetic gradiometer, wherein the respective axis of each gradiometer is not parallel to a respective axis of any other of the gradiometers; and

determining from output signals of the three electromagnetic gradiometers components of a gradient tensor of the electromagnetic field and components of the electromagnetic field.

74. (New) The method of claim 73 wherein angularly displacing each gradiometer is performed by rotating the gradiometer continuously during operation of the gradiometer.

75. (New) The method of claim 73 wherein angularly displacing each gradiometer is performed by rotating the gradiometer piecewise about the respective axis.

76. (New) The method of claim 73, wherein the respective axis of rotation of each axial gradiometer is positioned substantially perpendicular to the axial alignment of the first and second field vector sensors, substantially between the first and second field vector sensors, and substantially equidistant from the first and second field vector sensors.

77. (New) The method of claim 73 wherein the field vector sensors of the axial magnetic gradiometer are one of: SQUIDs, flux gates and superconducting pick up-loops.

78. (New) The method of claim 77 wherein the sensitivity vectors of the field vector sensors lie substantially in a nominal x-y plane, and wherein the axial magnetic gradiometer is rotated about a nominal z-axis perpendicular to the x-y plane.

79. (New) An electromagnetic field detection device comprising:

three electromagnetic axial gradiometers, each gradiometer having at least first and second field vector sensors connected in a differencing arrangement; and

means for angularly displacing each electromagnetic gradiometer about a respective axis relative to an electromagnetic field during operation of the electromagnetic gradiometer, the respective axes being non-parallel; and

processing means for determining from output signals of the three electromagnetic gradiometers components of a gradient tensor of the electromagnetic field and components of the electromagnetic field.

80. (New) The device of claim 79 wherein the means for angularly displacing each electromagnetic gradiometer is operable to rotate each gradiometer continuously during operation of the gradiometer.

81. (New) The device of claim 79, wherein the means for angularly displacing each electromagnetic gradiometer is operable to rotate each gradiometer piecewise about the axis of rotation.

82. (New) The device of claim 79, wherein the respective axis of rotation of each axial gradiometer is positioned substantially perpendicular to the co-axial first and second field vectors, substantially between the first and second field vector sensors, and substantially equidistant from the first and second field vector sensors.

83. (New) The device of claim 79, wherein the field vector sensors of the axial magnetic gradiometer are one of: SQUIDs, flux gates and superconducting pick up-loops.

84. (New) The device of claim 83 wherein the sensitivity vectors of the field vector sensors of each gradiometer lie substantially in a nominal x-y plane, and wherein the means for angularly displacing each electromagnetic gradiometer comprises means for rotating the at least first and second field vector sensors about a nominal z-axis perpendicular to the x-y plane.

85. (New) The method of claim 73 further comprising distinguishing field gradient information from field information in the Fourier domain.

86. (New) The method of claim 73 further comprising distinguishing information about the g_{xy} component of the gradient tensor from information due to the diagonal gradient components, even at the same frequency.

87. (New) The method of claim 73 wherein DC offsets are determined and monitored to provide information about the operating conditions of the gradiometers, and wherein the DC offsets comprise one or both of: low frequency drift in at least one field vector sensor of the at least three gradiometers; and the fixed offset of at least one field vector sensor of the at least three gradiometers.

88. (New) The method of claim 73 wherein the at least three gradiometers are rotated at differing frequencies, in order to facilitate separation of their data signals in the Fourier domain.

89. (New) The device of claim 79 wherein the at least three gradiometers are rotated at differing frequencies, in order to facilitate separation of their data signals in the Fourier domain.

90. (New) The device of claim 79 further comprising means for detecting and measuring a DC offset, wherein the DC offset comprises one or both of: low frequency drift in at least one field vector sensor of the at least three gradiometers; and the fixed offset of at least one field vector sensor of the at least three gradiometers.

91. (New) The device of claim 79 further comprising means for distinguishing field gradient information from field information in the Fourier domain.